No. 86 January, 1967

RESOURCE MANAGEMENT REPORT

ONTARIO

DEPARTMENT OF LANDS AND FORESTS

HON. RENE BRUNELLE
Minister

G.H.U. BAYLY
Deputy Minister

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FISH AND WILDLIFE BRANCH

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WATERFOWL HABITAT IMPROVEMENT PROJECT USING AMMONIA NITRATE/FUEL OIL MIXTURE FORT FRANCES DISTRICT

by
E.J. Swift and A.R. Stasus

Abstract

A waterfowl habitat improvement project was initiated in the Fort Frances District using an ammonia nitrate and fuel oil mixture to blast potholes. Two potholes were blasted and the desired effect was achieved. The aim of this project is to increase the amount of waterfowl breeding area in the Fort Frances District. Approximate cost of material involved in the project was $18.00.

Introduction

It has been apparent to the Fish and Wildlife staff that even with the abundant water supply in the Fort Frances District the duck population is limited. The most obvious reason is a lack of suitable breeding and nesting areas associated with most of the waters in this district. This situation could be improved if suitable conditions were established.

The area most suited to the undertaking proposed, was found to be the south-west portion of the Fort Frances District. This area, part of the agricultural district, has lost many wetlands over the years from an expanded and intensified agricultural land reclamation program. With the continual decline in wetland numbers there will inevitably be a decrease in the waterfowl population.

One aspect that has significance in the establishment of such a project, in this part of the district, is that the area is situated on the eastern edge of the Mississippi Flyway. With the area being in such a favourable location it is believed that utilization of the potholes will be favourable.

The overall objective of the project was to establish potholes which will be used as nesting and breeding sites. Along with the main objective it is also the district's desire to understand more fully the handling and use of ammonia nitrate-fuel oil (AN/FO) mixture as a technique in wildlife management.

Site Selection

Before the actual blasting was done a site selection study was conducted. This study assesses the capability of the soil to sustain a stand of vegetation suitable to waterfowl and whether the area would be suitable for pothole construction.

The study was carried out by on the spot examination of the sites. Data regarding sites were recorded on forms provided. (figure #1).

After several sites had been inspected discussion was held as to which sites were to be utilized for the project. In these discussions form information was referred to, and other aspects of the topography were given consideration.

One aspect that was examined carefully was the problem of accessibility. It was felt that the area should be easily accessible by road, so as to provide transportation of materials and examination of the site at later dates.

Consideration was also given to water table levels. To maintain a fairly stable water level, in a proposed pothole, the water table level should be relatively close to the surface.

Handling & Use of Explosives

After making inquiries as to the various blasting agents available and suited to the project, it was decided that an Ammonia Nitrate-Fuel Oil (AN/FO) mixture would be used. This mixture was chosen because of low cost and safety characteristics.

Materials used to carry out the project are as follows:

1. ammonia-nitrate prills
2. dynamite (40-60%)
3. prima cord
4. dynamite caps
5. fuel oil #2
6. plastic bags
7. dynamite fuse
8. shovels and safety helmets
9. cap crimper
10. friction tape

The following is the procedure for using AN/FO mixture for pothole blasting.

In making the ammonia nitrate-fuel oil blasting charge, one gallon of #2 fuel oil is mixed with 100 pounds of ammonia nitrate. This ammonia nitrate-fuel oil (AN/FO) mixture is then allowed to stand for 12 hours to insure adequate absorption of the fuel oil.

Note: If the mixture is intended to be left standing for any length of time, over two weeks, it is necessary to rotate the bags in a manner so that the fuel oil does not settle to the bottom.

To detonate the AN/FO mixture a stick of 60% blasting dynamite or 40% ditching dynamite can be used. A dynamite stick with prima cord through it (Fig.2) is placed in the AN/FO mixture so that it is completely covered. Then the plastic bag, which is being

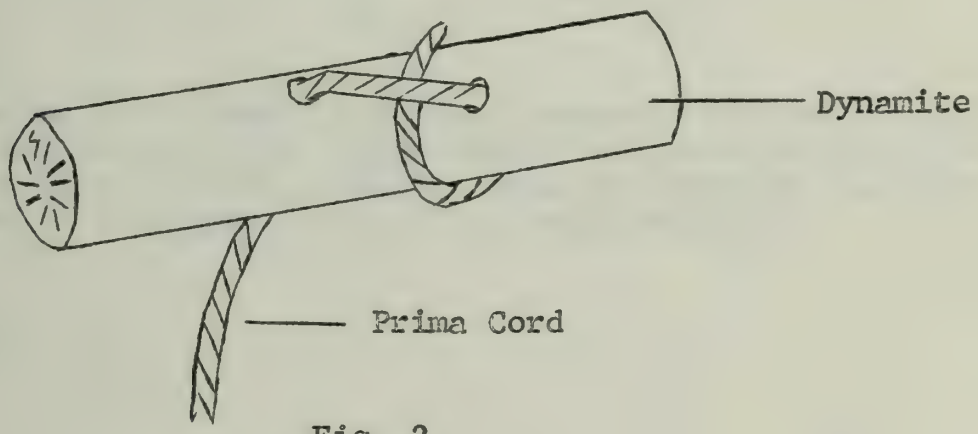


Fig. 2

used as the container, is squeezed so the excess air is removed. After this the open end of the plastic bag is taped closed making the container air tight (Fig.3). (AN/FO mixture will not ignite if wet).

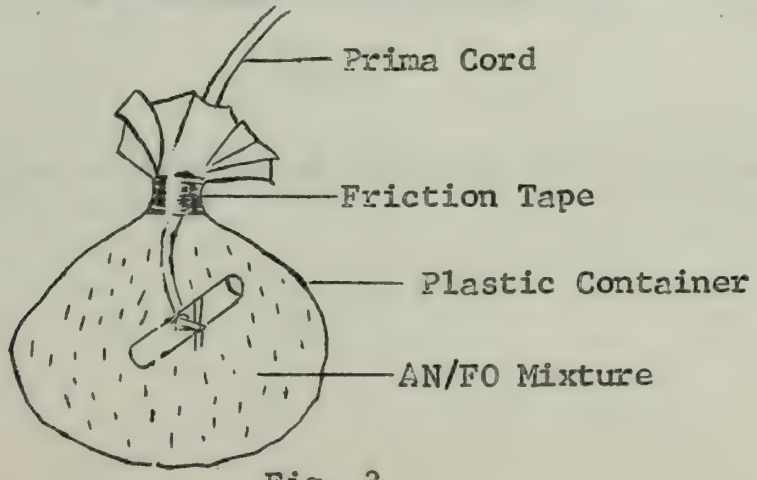


Fig. 3

In pothole blasting usually more than one charge is used and therefore a means of connecting charges is necessary. The most efficient method is to connect a series of charges by using prima cord (Fig.4). When the charge is detonated with this type of arrangement all charges explode instantaneously.

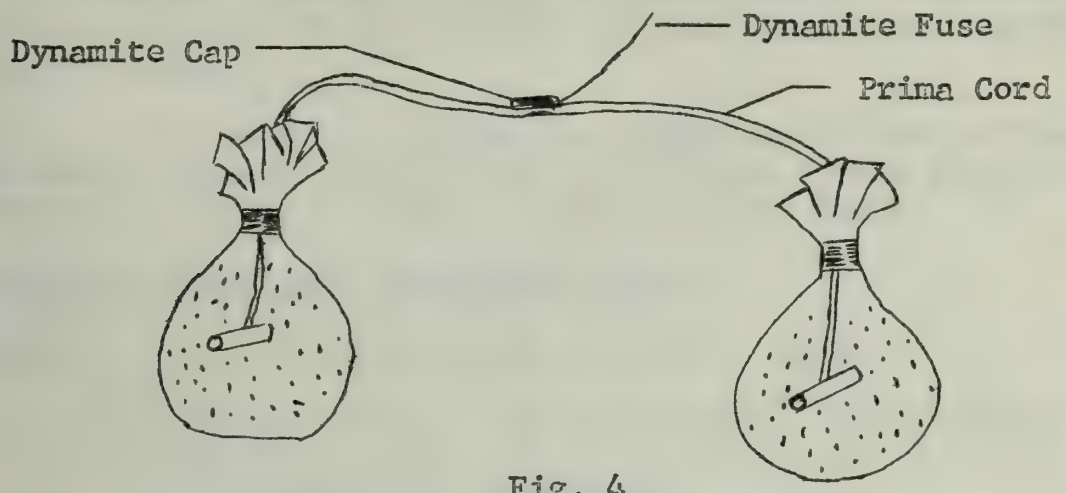


Fig. 4

After the charges have been prepared they are placed in previously dug holes. (The holes should be approximately 2 ft. in depth and spaced 12 ft. apart). Then the dynamite cap with a fuse was taped on to any part of the prima cord (Fig.5).

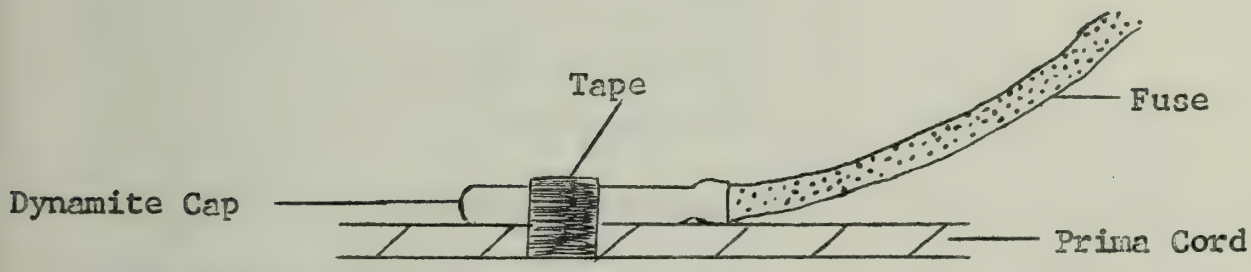
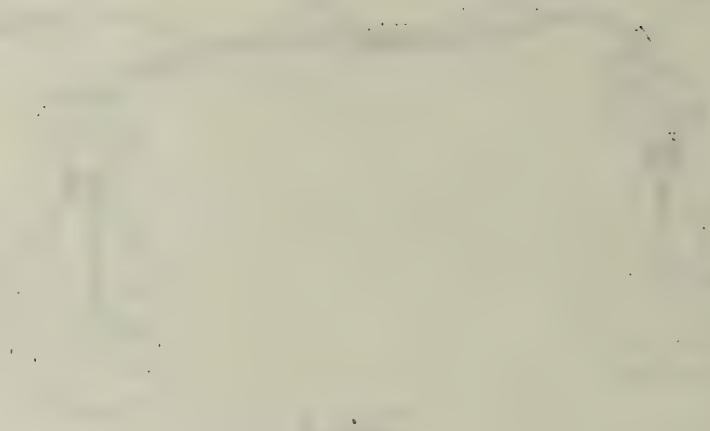


Fig. 5

With the completion of the last step the charge is ready to be detonated.



Safety Precautions

In handling the AN/FO mixture, as with any other blasting agent, care must be exercised in: mixing, storing, handling, and use of this compound. Before any attempt is made to use this mixture an understanding of blasting techniques must be fully understood. And the actual blasting operation should only be initiated under the guidance of a person who has had previous experience in the use of blasting agents.

Two pamphlets giving the basic principles of blasting and safety measures that should be followed during blasting are referred to in the reference section of this paper.

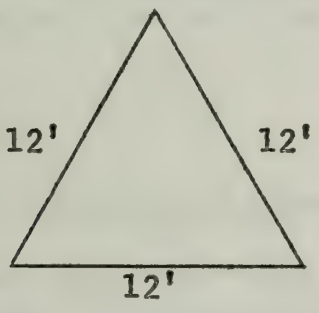
Location of Waterfowl Improvement Sites

Number 1 - Kingsford Twp., Con. II, Lot 5, NE $\frac{1}{4}$

Size of charge - 3 bags of AN/FO, approximately 38 lbs. ea.
Size of pothole - 22 ft. by 14 ft. and 5-1/2 ft. in depth.
Soil condition - sandy loam.

Number 2 - Crozier Twp., SW $\frac{1}{4}$ Sec.8

Size of charge - same as #1
Size of pothole - 22 ft. by 20 ft. 5 ft. in depth
Soil condition - peat bog



Blasting Pattern Used

Future Management Plans

It is felt that the time is rapidly approaching when the establishment of a specific management area, set aside solely for the purpose of increasing waterfowl breeding habitat, will be a necessity. This management area then will be the testing site for future waterfowl management techniques. From this program a better understanding will be possible regarding waterfowl propagation in the area.

In the United States plans such as we are initiating here are being expanded at an ever increasing pace, taking in not only projects on government owned land, but on privately owned land as well. This indicates the confidence people have placed in an undertaking which has as its goal the preservation of waterfowl; starting in the present and looking to the future. We in this area also should acknowledge the importance of such an undertaking and pursue it with the optimism it deserves.

Discussion

Having carried out this project we have a definite feeling of accomplishment. This feeling is due to the realization that this undertaking is different from other projects attempted. Instead of taking a census of a population and being satisfied with statistical calculations, we are actually making a demonstrable effort to help waterfowl. In these potholes we expect to see waterfowl where there were none before.

We sincerely hope that our enthusiasm can be projected to others who hold similar interests. If a land use body, such as ARDA, comes to realize the value and importance of the work initiated in the district, we feel their support will be forthcoming.

At a future time a demonstration may be scheduled on the use of AN/FO mixture. When the demonstration is to be held information regarding date and time will be placed in the newsletter of the district.

Recommendations

1. This should be a continuing program.

2. Future sites should have not less than three potholes. (It is felt that less than 3 potholes would not have a sufficient water area to be attractive to waterfowl).

3. Periodic checks should be made of these sites, e.g. checks of breeding pairs, brood counts, species, etc.

4. A series of colour slides should be made depicting the entire operation.

5. For the present this project should be restricted to Crown Land.

Acknowledgements

Our thanks to P.R. Brown for arranging with Steep Rock Iron Mines the acquisition of the AN/FO mixture and to Conservation Officers G. Thompson and A. Martin for their assistance in site selection.

Fig. I

SITE INFORMATION RE POTHOLE BLASTING

1. Date: _____

2. Exact Location: (Lot, Con., Twp.)

3. Species of plants, brush, and trees on site with approximate height:

   a. _____

   b. _____

   c. _____

4. Classification of plot as to tree and brush cover:

   a. open

   b. semiopen

5. Type of soil present:

   a. loam

   b. sand

   c. clay Comments

   d. "loon"

   e. peat

6. Information regarding the soil sample from the area.

7. Nearest body of water (1/2 acre or more) to the proposed water hole.

Note: Distance in #7 should not be greater than one mile for best results.

8. Species of waterfowl in the area at present:

KNOWN	PRESUMED

9. Make investigation to ascertain whether the land is held by the Crown.

References

(a) Queen's Printer and Controller of Stationery, (1958). The Handling of Explosives. Ottawa, Cat. No. M82-158.

(b) Forest Service, U.S. Dept. of Agriculture and Michigan Dept. of Conservation. Marsh Blasting with Ammonium Nitrate.

A CREEL CENSUS STUDY OF STURGEON LAKE SUMMER - 1965

by
J. J. Armstrong

Abstract

The basic concept underlying the creel census method presented in this paper is that there are ninety time periods of eight hours each in a month of thirty days. When a sample of these eight-hour periods is randomly selected and creel census is conducted within the period so selected, estimates of total harvest by species, fishing pressure and number of anglers by month and season can be calculated using formulae presented herein. It is suggested that the efficiency of creel census operations can be substantially increased under a pre-determined system without a corresponding increase in the work-load of census clerks.

Estimates are presented on the total harvest of the four main game fish species taken from Sturgeon Lake during May to September, 1965, in addition to the estimated fishing pressure and number of anglers.

Introduction

During the winter of 1965, a plan was proposed (Armstrong ms 1965) explaining the need for and the methods to be used on, a creel census study of Sturgeon Lake. The primary aim of this study was to operate, evaluate, and if necessary adjust the methods described to determine a realistic approach to the problem of conducting creel census under the conditions encountered in the Kawartha Chain of Lakes. A secondary, although equally important objective, was to obtain estimates of total angler harvest for each game fish species and estimates of the effort required to accomplish this harvest on Sturgeon Lake.

Sturgeon Lake is located in the County of Victoria in the Townships of Verulum and Fenelon, at approximately 78° 42' N. Long and 44° 46' W. Lat. The lake has a surface water area of approximately 10,600 acres, a maximum depth of 64 feet in a very small area, and a mean depth of 13.7 feet. As demonstrated in Figure 1 this lake has three main arms on each of which a river is located. The western arm receives the main flow of the Trent Canal System at Fenelon Falls via the Otonobee River which leaves by the eastern arm at Bobcaygeon.

The southern arm receives the smaller Scugog River.

On account of its relative proximity to heavily populated metropolitan areas, chief among which is Toronto, Sturgeon Lake is easily accessible to a great number of people. Summer cottages are very common on Sturgeon Lake, which, located as it is on the Kawartha Chain of Lakes, is a summer vacationland. Numerous commercial tourist establishments cater to both American and Canadian tourists.

When the majority of anglers on this lake talk of "fish" they are invariably referring to the walleye (Stizostedion vitrem), so great is the popularity of this species. The maskinonge (Esox masquinongy) although present in much smaller numbers than the walleye, is probably second in popularity. It appears that only a very small proportion of the anglers actively angle for either of the two species of bass (Micropterus dolomieu and M. salmoides).

The difficulties of conducting a creel census with the intensity required to sample the entire fishery on Sturgeon Lake are immense. Anglers are present on Sturgeon Lake at all hours of the day and night. Although the majority of anglers fish during the daylight hours, many predominantly pursue their sport at night. Such night-time activity makes travel, not to mention the counting of boats, by census clerks very difficult, and on some nights, impossible. The problem is complicated by the lack of any main access points to the lake. As mentioned previously, summer cottages and tourist resorts are numerous and each location offers a potential access point. Even the nature of the lake does not facilitate the operation of a creel census; certain areas (e.g. Goose Bay) popular to anglers contain numerous stumps and logs which slow operations considerably.

The collection of creel census information in the past has placed the major emphasis on providing estimates of catch-effort statistics and coverage for enforcement purposes rather than estimates of total harvest, total anglers, etc.. When the method to be described was first conceived, it was realized that with the same amount of effort by the census clerks a considerably greater amount of information could be provided in addition to the usual catch-effort data and enforcement coverage. This has largely been achieved by the use of a flexible schedule established under a pre-determined plan that samples the time available to the angler for fishing. If any expansion is to be accomplished, and such expansion is needed to cover the remainder of the Kawartha Lakes, it will only be possible with the addition of men and equipment.

Acknowledgements

I wish to thank first the following personnel who assisted in this study by collecting the basic data: Conservation Officers H. Tuvi and E.J. Mitchell, and former Conservation Officer J.A. Robertson; summer casuals I. Arnup, M. McKenzie and L. Turvey. To Mr. R.D. Dyke, who was so helpful in the formulation and execution of this plan, I especially wish to offer my thanks. For the encouragement and interest shown by Mr. R.M. Christie, former District Biologist at Lindsay, and Mr. F.W. Swanson, Fish and Wildlife Supervisor, I am very grateful.

Sampling Procedures

Since a day has three eight-hour periods, a month composed of thirty-one days has ninety-three eight-hour periods. Similarly, a month of thirty days has ninety such eight hour periods. These eight hour periods, when defined by eight-hour time intervals, can be randomly sampled so that an equal number of samples are drawn from each of the three defined time intervals. Thus, each period is associated with the remaining two periods, and the sum of the three comprise a twenty-four hour sampling day, or a series. When the sampling periods have been chosen as described above, and each period on which creel census will be conducted has been assigned to a particular day of the month, the creel census data collected for that series on those days can be summed with that collected during the other periods in that series. This sum then represents the data that would have been collected on a randomly sampled day on which census clerks were operating for the entire twenty-four hours.

The above paragraph describes the theory behind the creel census method presented in this paper. In actual practise the definitions of the time intervals for each of the three periods are presented below.

Period	Time Interval
A (morning)	4 a.m. - 12 noon
B (afternoon)	12 noon - 8 p.m.
C (evening)	8 p.m. - 4 a.m.

These definitions were employed during the month of May at the end of which they were discarded for practical reasons to be presented later. During the months of June to September inclusive, the following definitions were used.

Period	Time Interval
A (morning)	8 a.m. - 3 p.m.
B (evening)	3 p.m. - 10 p.m.

Although each period in these latter definitions was only composed of seven hours, each period was treated as if it had eight hours. The errors associated with this type of treatment are considered negligible because of the overlap in the times that anglers are operating in relation to the time intervals of each sampling period with a resultant overlap in the information collected.

As it is well known that fishing pressure is greater on statutory holidays and weekends, it was assumed that such days would be equally subject to random selection as the days upon which fishing pressures are less. The other alternative is to treat days of heavy fishing pressures separately from the days of lesser fishing pressures. Such a procedure would only complicate even further an already complex situation and, for the questionable amount of additional accuracy, may not be warranted.

In the selection of the creel census days of any given month, previously numbered pieces of cardboard to correspond to the days of the month were selected randomly. When the creel census days had been selected, a random selection was made of one of the sampling periods which was assigned to the first creel census day previously selected. The end result of this procedure was the assignment of one period for each of the days selected. As previously mentioned, three sampling periods composed a sampling day during the month of May. For this month, the three creel census days to each of which a different period (A, B or C) had been assigned was termed a Series. For the month of May three creel census days constituted a series, while in the months of June to September inclusive, only two creel census days constituted a series.

Since it was impossible to adhere to a fixed schedule of days and sampling periods, it was necessary that a considerable amount of flexibility be built into the schedule. This was accomplished by establishing a policy as follows:

(a) Creel census was to be conducted on the scheduled day whenever possible.

(b) Where it was known in sufficient time that creel census could not be conducted on a scheduled day, the census clerk was to randomly select one of the days immediately preceding or following the scheduled creel census day. It was suggested that a coin be flipped to accomplish this method of selection.

(c) Where an urgent matter would not allow the operation of (a) or (b) above, creel census was to be conducted on the next available day following the scheduled creel census day.

(d) When weather conditions rendered lake travel hazardous, it was assumed that no anglers would be present on the lake and a "nil fishing" report would be submitted by the census clerk.

Since one sampling day per month only represents 3.3% of the available fishing time in a month composed of thirty days, it was realized that this one sampling day was inadequate in obtaining reliable estimates from the creel census. However, because of the heavy work load on the census clerks, it was realized that a great deal of time could not be spared for creel census. Consequently, the original objective was to obtain creel census data sufficient to cover at least two sampling days, each sampling day being composed of three eight-hour periods. An additional sampling day was included in the schedule with the understanding that if the census clerks felt they could conduct creel census on the extra days, this was desirable.

When night travel during period C (evening) was found to be hazardous and impractical, this period was dropped at the beginning of June and new definitions for the two remaining periods were established. These definitions have been presented previously (page 4)

The schedule of days upon which creel census was to be conducted during 1965 is presented in Table 1(appended).

Sturgeon Lake was divided arbitrarily into six sampling units as demonstrated in Figure 1. It was originally thought that a minimum of two hours would be required to adequately sample the fishermen in each of these sampling units. If one census clerk were to sample units one to three, he should be able to cover this area in eight hours, which allows two hours for meals and travel time. Similarly one census clerk should be able to sample units four to six in the same time.

It was also originally thought that to interview all the anglers in a sampling unit would be impossible. To circumvent this problem census clerks were instructed to sample a number of boats in each unit and to record the total number of boats located in the sampling unit.

The type of information that was to be collected was similar to that which had been collected under the previous system. A sample report form is appended. (Table 13)

Procedure of Analysis

In order to facilitate the analysis of the creel census data collected, it was found necessary to establish formulae which would serve as guides. Several assumptions were necessary to construct these formulae. These assumptions are presented below.

1. Fishermen are checked by the census clerk in the middle of their fishing trip.

2. The numbers of anglers remains at a constant level over an eight-hour sampling period. Individuals are replaced as they depart by an equal number of anglers who are just commencing their fishing trips.

3. Fish are captured at the same rate after an angler has been checked as before he was checked.

4. The rate of angler turnover in an eight-hour period varies inversely as the average length of the fishing trips.

5. The time interval per "sampling day" is sixteen hours.

The following is a list of the definitions of the symbols used in the formulae to be presented later. Although only two periods are considered, the same type of reasoning is used when three periods are used as has been done for the data collected in May 1965.

Symbol	Definitions
b	number of men checked in one period
c	number of boats checked in one period
d	number of boats not checked in one period
e	number of shore anglers checked
f	number of shore anglers not checked
g	total man-hours of anglers checked
h	number of walleye taken
i	number of largemouth bass taken
j	number of smallmouth bass taken
k	number of maskinonge taken

During the course of the creel census during the interval of one period, records were kept on the total number of boats observed, the number of boats checked and the number of anglers in the boats that were checked. When the ratio of the total number of boats to the number of boats checked in a period is multiplied by the number of men checked, the total number of men present at the time of the creel census can be calculated. Expressed algabraically, this becomes for period A:

$$\frac{b(c + d)}{c}$$

To this quantity must also be added the total number of shore anglers which were either checked or not checked. The expression that represents the number of men angling during the time that the creel census was conducted becomes:

$$\frac{b(c+d)}{c} + e + f$$

This quantity only represents the number of anglers during a time interval which depends on the rate of angler turnover (assumption 4) and does not represent the total number of anglers present during the entire period. Therefore, to this quantity must be added the influence of the angler turnover within the eight-hour period.

If anglers are checked in the middle of their fishing trip (assumption 1) then the average length of the fishing trip is twice the average time the anglers fished before they were checked by a census clerk. This quantity is $\frac{2g}{b}$ which, when divided into the length of the sampling period, provides an estimate of the rate of the angler turnover within an eight-hour sampling period. This quantity reduces to $\frac{4b}{g}$ which, when multiplied by the quantity $\frac{b(c+d)}{c} + e + f$ becomes: $\left[\frac{b(c+d)}{c} + e + f\right] \frac{4b}{g}$

This quantity provides an estimate of the total number of anglers during an eight-hour sampling period.

If we designate the number of men fishing on the entire lake during period A equal X and that some quantity corresponding to period B be Y, then X + Y equals the total number of men fishing on the lake during one sampling day.

Since the quantity $\frac{b(c+d)}{c} + e + f$ represents the number of men on the lake at any time during an eight-hour sampling period, the estimated number of man-hours spent fishing is eight times this quantity.

The sum of the two quantities for the two periods provides an estimate of the total number of man-hours of fishing on the entire lake during a sampling day.

The estimated number of a fish species h taken in period A is equal to the rate of capture of species h times the estimated number of man-hours spent during period A. Since the rate of capture of a species h equals $\frac{h}{g}$, then $\frac{8h}{g} \frac{b(c+d)}{c} + e + f$ equals the number of this fish species captured in period A.

The sum of the estimated numbers of fish species h harvested in the two periods is an estimate of the number harvested in one sampling day.

Results

The basic data compiled from the creel census reports submitted by the creel census clerks are presented in Tables 2, 3, 4, 5 and 6 (appended) for the months of May to September respectively.

Estimates, using the formulae previously described, from these basic data are presented in Tables 7, 8, 9, 10 and 11 for the same months respectively (appended). Table 12 (appended) summarizes the data contained in the previous ten tables.

Discussion

Where it is impossible to obtain a complete creel census, especially on large bodies of water, a predetermined creel census plan is a definite necessity. Because of the many factors, both administrative and statistical that can affect the creel census results, it is also necessary that all these factors be recognized and precautions be taken against the sources of bias which are largely the result of the particular circumstances relative to the body of water under study. Consequently, there are many different types of creel census procedures. Certainly a complete creel census is desirable, but conditions under which this type of census can be accomplished are rare. Consequently most creel census studies utilize some form of systematic sampling. Some studies lay emphasis on the sampling of anglers in a predetermined area of the body of water under study. Other studies utilize aircraft to obtain total counts while census clerks working from boats obtain data on rate of angler harvest, fish lengths, etc. A fourth type of

census is based on the assumption that all anglers will submit data voluntarily by recording the requested data on supplied cards and depositing the completed cards into a creel census box located at the body of water. A novel method of obtaining creel census information has been applied to a put-and-take speckled trout fishery at St. Williams Forestry Pond (Johnson, 1965). Before the trout are planted in this pond, a predetermined ratio are marked with serially numbered jaw tags. Anglers are advised that for each tag returned, a certain number of trout will be re-planted in this pond. A sixth method commonly used in obtaining creel census information is for the census clerk to sample anglers in an unsystematic method by spending time on creel census when he is inclined to do so, or when a release from the pressures of his other work allows. Such a method, by its unsystematic approach, allows only for the collection of data on angler success and prohibits the calculation of estimates of total harvest, total fishing, pressure, etc. Consequently the efficiency of the census clerk is greatly reduced, since even with the same amount of effort applied in a systematic manner, much more valuable information can be collected.

Basically, this was the underlying reason for establishing the creel census method described in this paper.

There are several serious limitations to this creel census method. Of these, the most obvious is the small proportion of time covered by the creel census in relation to the time available for fishing between the hours of 8:00 a.m. and 10: p.m. When creel census is conducted on six eight hour periods (i.e. 3 sampling days) in a month, only 10% of the time available to the angler between the above mentioned times is covered. The statistical ranges associated with the estimates obtained will probably be large as a result of this small coverage. Unfortunately these ranges have not been calculated for the lack of a suitable method.

Seven sampling days in a month of thirty days would cover approximately 23.4% of the time available to the angler, while ten sampling days would cover approximately 33.3% of the available time.

Another limitation is the difficulty encountered in conducting creel census at night. Not only is the night work hazardous to the census clerks, but their range of vision is also reduced. Undoubtedly the estimates presented in this report are low on account of the difficulty of conducting creel census during the most successful times for the capture of the walleye predominantly.

During the creel census on Sturgeon Lake attempts were made to collect data on size and age composition of the anglers' catches in order to calculate the number of pounds harvested per unit area and the degree of utilization of the various year classes. The results, however,

were not satisfactory due primarily to the difficulty in examining fish on the lake. It is hoped that this difficulty can eventually be overcome since the information obtained will aid considerably in evaluating the various lakes as to their potential and actual yields.

References

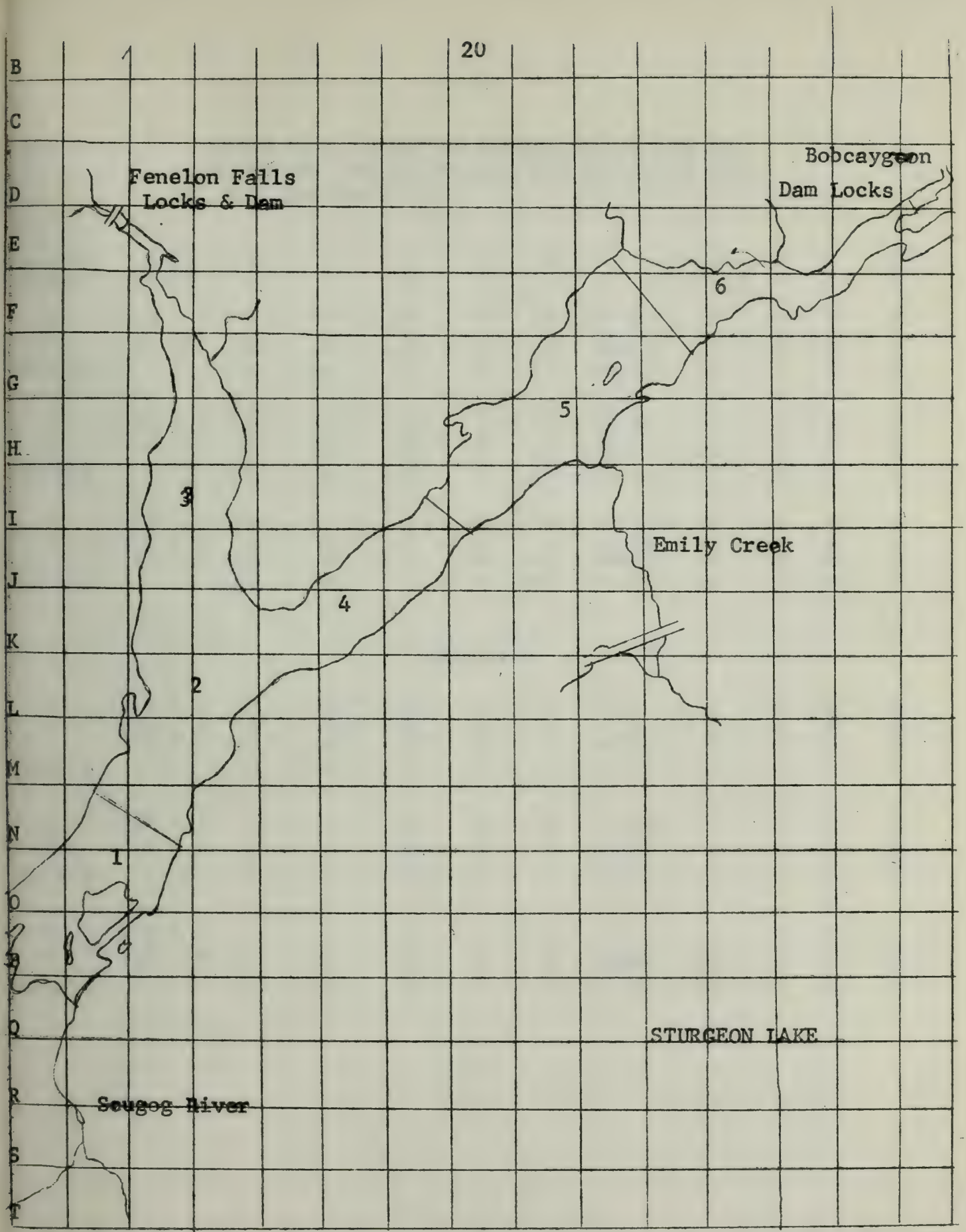
Armstrong, J.J., 1965. Proposed plan for conducting creel census on Sturgeon Lake. Unpublished ms. Department of Lands and Forests, Lindsay.

Johnston, D.R., 1965. Public fishing ponds for trout. Ontario Fish and Wildlife Review 4(1): pp. 18-24.

TABLE 1 - CREEL CENSUS SCHEDULE - 1965

Month	Sampling Interval	Total Days	Sampling Dates	Time Period	Day of Week	Series
May	8-31 inc.	18	8	A	Sat.	III May*
			10	C	Mon.	II May
			15	C	Sat.	I May
			20	A	Thurs.	II May
			22	C	Sat.	III May
			24	A	Mon.	I May
			26	B	Wed.	II May
			27	B	Thurs.	III May
			30	B	Sun.	I May
June	1-30 inc.	30	2	B	Wed.	II June
			5	A	Sat.	I June
			19	B	Sat.	I June
			25	A	Fri.	II June
			27	A	Sun.	III June
			28	B	Mon.	III June
July	1-31 inc.	31	3	B	Sat.	I July
			6	A	Tues.	I July
			15	A	Thurs.	III July
			21	B	Wed.	II July
			22	A	Thurs.	II July
			27	B	Tues.	III July
August	1-31 inc.	31	3	B	Tues.	II Aug.
			11	A	Wed.	II Aug.
			17	B	Tues.	III Aug.
			20	A	Fri.	I Aug.
			24	A	Tues.	III Aug.
			25	B	Wed.	I Aug.
September	1-30 inc.	30	5	A	Sun.	I Sept.
			6	A	Mon.	III Sept.
			7	B	Tues.	III Sept.
			10	B	Fri.	I Sept.
			23	B	Thurs.	II Sept.
			27	A	Mon.	II Sept.

Astericks (*) indicate that during the month of May these are additional days to be done if time permits.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Fenelon Falls
Locks & Dam
Bobcaygeon
Dam Locks
Emily Creek
STURGEON LAKE
Sougog River
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Table II: BASIC DATA COLLECTED DURING SERIES FOR MAY (TOP) AND THE BASIC DATA FOR SERIES II FOR MAY (BOTTOM)

Period	Areas	b	c	d	e	f	g	h	i	j	k
A	1,2 & 3	93	43	28	0	51	97.50	22	0	0	0
A	4,5 & 6	43	20	9	0	0	85.50	13	0	0	0
Totals		136	63	37	0	51	183.00	35	0	0	0
B	1,2 & 3	60	25	8	0	19	105.25	28	0	0	0
B	4,5 & 6	28	11	0	0	0	60.50	3	0	0	0
Totals		88	36	8	0	19	165.75	31	0	0	0
C	1,2 & 3	37	17	3	0	150	89.25	24	0	0	0
C	4,5 & 6	6	4	0	0	0	12.50	2	0	0	0
Totals		43	21	3	0	150	101.75	26	0	0	0
					SERIES II						
A	1,2 & 3	23	11	0	2	0	41.5	9	0	0	0
A	4,5 & 6	5	3	0	0	0	4.0	1	0	0	0
Totals		28	14	0	2	0	45.5	10	0	0	0
B	1,2 & 3	1	1	0	5	0	8.25	2	0	0	0
B	4,5 & 6	8	3	0	0	0	17.50	2	0	0	0
Totals		9	4	0	5	0	25.75	4	0	0	0
C	1,2 & 3	-	-	-	-	-	-	-	-	-	-
C	4,5 & 6	28	10	0	0	0	46.25	27	0	0	0
Totals		28	10	0	0	0	46.25	27	0	0	0

TABLE 3 - BASIC DATA COLLECTED DURING SERIES I FOR JUNE (TOP) AND THE BASIC DATA FOR SERIES II FOR JUNE (BOTTOM)

Period	Areas	b	c	d	e	f	g	h	i	j	K
A	1,2 & 3	82	40	21	0	0	180.00	52	0	0	0
A	4,5 & 6	25	13	0	0	3	31.00	0	0	0	0
Totals		107	53	21	0	3	211.00	52	0	0	0
B	1,2 & 3	65	34	34	0	1	128.25	20	0	0	0
B	4,5 & 6	38	20	3	0	4	43.75	6	0	0	0
Totals		103	54	37	0	5	172.00	26	0	0	0

SERIES II

A	1,2 & 3	26	13	1	0	0	65.60	5	0	0	0
A	4,5 & 6	11	6	1	4	0	18.75	1	0	0	0
Totals		37	19	2	4	0	84.35	6	0	0	0
B	1,2 & 3	22	10	0	0	0	61.00	22	0	0	0
B	4,5 & 6	32	17	0	0	0	54.50	5	0	0	0
Totals		54	27	0	0	0	115.50	27	0	0	0

TABLE 4 - BASIC DATA COLLECTED DURING SERIES I FOR JULY (TOP), THE BASIC DATA FOR SERIES II (MIDDLE) AND SERIES III (BOTTOM)

Period	Areas	b	c	d	e	f	g	h	i	j	k
A	1,2 & 3	38	20	16	1	0	65.75	8	0	0	1
A	4,5 & 6	17	10	3	0	0	20.25	1	0	4	0
Totals		55	30	19	1	0	86.00	9	0	4	1
B	1,2 & 3	41	18	3	0	2	119.50	8	2	1	1
B	4,5 & 6	67	33	5	0	3	94.00	2	2	0	1
Totals		108	51	8	0	5	213.50	10	4	1	2

SERIES II

A	1,2 & 3	55	29	2	0	0	100.50	1	0	3	0
A	4,5 & 6	54	27	0	0	0	93.50	3	0	0	0
Totals		109	56	2	0	0	194.00	4	0	3	0
B	1,2 & 3	62	30	8	0	5	101.00	20	1	0	2
B	4,5 & 6	43	20	5	0	0	56.75	7	0	1	0
Totals		105	50	13	0	5	157.75	27	1	1	2

SERIES III

A	1,2 & 3	32	15	12	0	0	77.50	19	3	0	1
A	4,5 & 6	22	11	8	0	0	31.50	8	0	0	0
Totals		54	26	20	0	0	109.00	27	3	0	1
B	1,2 & 3	61	34	2	0	5	67.00	14	4	2	0
B	4,5 & 6	34	19	4	0	17	78.50	3	0	1	1
Totals		95	53	6	0	22	145.50	17	4	3	1

TABLE 5 - BASIC DATA COLLECTED DURING SERIES I FOR AUGUST (TOP) AND THE BASIC DATA FOR SERIES II OF AUGUST (BOTTOM)

Period	Areas	b	c	d	e	f	g	h	i	j	k
A	1,2 & 3	68	32	8	0	0	122.25	9	0	1	0
A	4,5 & 6	69	33	0	0	0	100.25	25	0	9	0
Totals		137	65	8	0	0	222.50	34	0	10	0
B	1,2 & 3	47	18	2	0	1	99.50	22	1	1	0
B	4,5 & 6	21	12	0	0	0	19.75	5	0	2	0
Totals		68	30	2	0	1	119.25	27	1	3	0
				Series II							
A	1,2 & 3	45	23	0	0	5	73.5	9	0	2	0
A	4,5 & 6	75	35	0	0	3	106.0	14	0	3	0
Totals		120	58	0	0	8	179.5	23	0	5	0
B	1,2 & 3	-	-	-	-	-	-	-	-	thunder storms	
B	4,5 & 6	33	19	1	0	3	38.5	0	0	3	0
Totals		33	19	1	0	3	38.5	0	0	3	0

TABLE 6 - BASIC DATA COLLECTED DURING SERIES I FOR SEPTEMBER

A	1,2 & 3	13	8	2	0	0	23.50	6	0	0	0
A	4,5 & 6	19	10	0	0	1	20.50	4	0	0	0
Totals		32	18	2	0	1	44.0	10	0	0	0
B	1,2 & 3	15	8	3	0	4	29.00	8	0	3	0
B	4,5 & 6	48	25	0	0	3	63.25	7	0	0	0
Totals		63	33	3	0	7	92.25	15	0	3	0

TABLE 7 - CREEL CENSUS SUMMARY - MAY 1965

	Series 1	Series 11	Combined	Average
Est.# men fishing	1110.0	161.2	1271.2	635.6
Est.# man-hrs.	3936.0	576.0	4512.0	2256.0
Est.# walleye harvested	850.9	201.0	1051.9	526.0

Estimates for May

Est.# men fishing	19.703.6
Est.# man-hrs.	66.936.0
Est.# walleye harvested	16.306.0

TABLE 8 - CREEL CENSUS SUMMARY - JUNE 1965

	Series 1	Series 11	Combined	Average
Est.# men fishing	607.2	179.8	787.0	393.5
Est.# man-hrs.	2647.2	791.2	3438,4	1719.2
Est.# walleye harvested	700.5	126.6	827.1	413.6

Estimates for June

Est.# men fishing	11,805
Est.# man-hrs.	51,576
Est.# walleye harvested	12,408

TABLE 9 - CREEL CENSUS SUMMARY - JULY 1965

	Series I	Series II	Series III	Combined	Average
Est. # men fishing	495.1	619.3	462.0	1576.4	525.5
Est. # man-hrs.	1765.6	2000.8	1610.4	5376.8	1792.3
Est. # walleye harvested	124.7	206.6	287.9	619.2	206.4
Est. # largemouth bass harvested	33.1	7.0	44.3	84.4	28.1
Est. # smallmouth bass harvested	42.1	21.0	17.5	80.6	26.9
Est. # maskinonge harvested	24.9	14.0	12.8	51.7	17.2

Estimates for July

Est. # men fishing	16,290.5
Est. # man-hrs.	55,561.3
Est. # walleye harvested	6,398.4
Est. # largemouth bass harvested	871.1
Est. # smallmouth bass harvested	833.9
Est. # maskinonge harvested	533.2

TABLE 10 - CREEL CENSUS SUMMARY - AUGUST 1965

	Series I	Series II	Combined	Average
Est. # men fishing	546.9	474.0	1020.9	510.4
Est. # man-hrs.	1820.0	1325.6	3145.6	1572.8
Est. # walleye harvested	321.4	202.0	523.4	261.7
Est. # largemouth bass harvested	4.9	0.0	4.9	2.45
Est. # smallmouth bass harvested	70.1	53.0	123.1	61.6
Est. # maskinonge harvested	0.0	0.0	0.0	0.0

Estimates for August

Est. # men fishing	15,822.4
Est. # man-hrs.	48,756.8
Est. # walleye harvested	8,112.7
Est. # largemouth bass harvested	76.0
Est. # smallmouth bass harvested	1,909.6
Est. # maskinonge harvested	0.0

TABLE II - CREEL CENSUS SUMMARY - SEPTEMBER 1965

	Series I
Est. # men fishing	293.8
Est. # man-hrs.	841.6
Est. # walleye harvested	155.8
Est. # largemouth bass harvested	0.0
Est. # smallmouth bass harvested	17.9
Est. # maskinonge harvested	0.0

	Estimates for September
Est. # men fishing	8,814.0
Est. # man-hrs.	25,248.0
Est. # walleye harvested	4,674.0
Est. # largemouth bass harvested	0.0
Est. # smallmouth bass harvested	537.0
Est. # maskinonge harvested	0.0

TABLE 12 - CREEL CENSUS - STURGEON LAKE, SUMMARY

	# Men Fishing	# Man Hrs.	# Y.P. Harvested	# L.M.B.	# S.M.B.	# Mask.
May	19,704	66,936	16,306	0.0	0.0	0.0
June	11,805	51,576	12,408	0.0	0.0	0.0
July	16,290	55,561	6,398	871	834	533
August	15,822	48,757	8,113	76	1,909	0
Sept.	8,814	25,248	4,674	0	537	0
Totals	72,435	248,078	47,899	947	3,280	533

KLMU - #1(a)

CREEL CENSUS - 19

Officer:

Date: in lieu of

Map Area # Series: Weather:

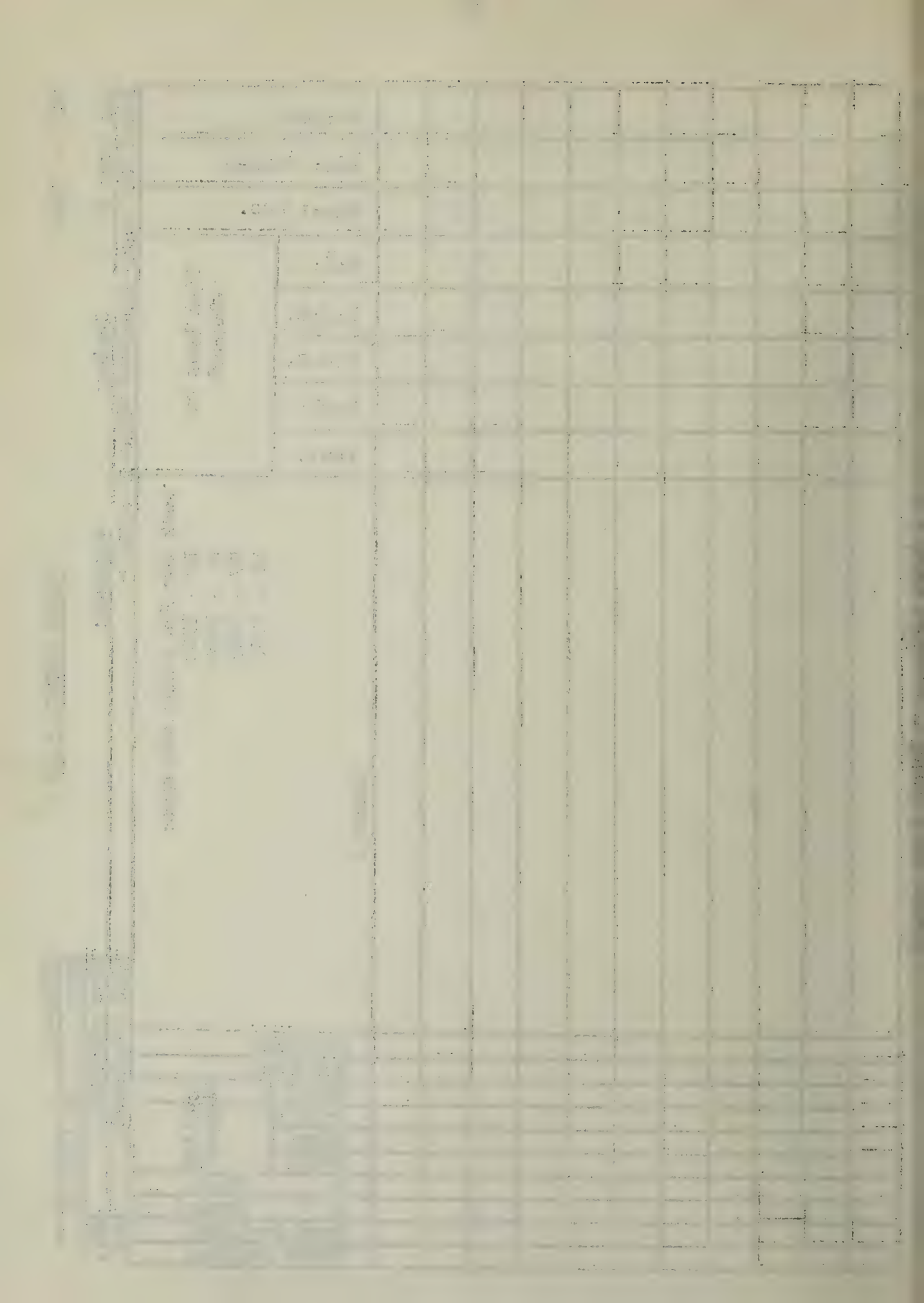
Time started: hrs.

Total No. boats observed while in area =

Time completed: hrs.

No. men	Hrs. fished	Total hrs.	Fish kept or released					Look for fin clips and tags: LP - 1963 RP - 1964 RV - 1965 LV - 1966 Remarks	Resident	Non-res.	Angling Method				Time Period		Boat Angling	Shore Angling
			Y.P.	L.M.B.	S.M.B.	Mask.	Panf.				Troll	Drift.	Cast.	Still	A	B		

5 - Fish Kept
2 - Fish Released = Total Fish Caught



NON-HUNTING LOSSES OF BIG GAME IN ONTARIO FROM 1958 - 1965

by
W.A. Creighton

The objectives of this study are to maintain continuous records of known annual loss of big game from causes other than the legal kill, to record sex and age composition of big game from this unbiased kill and to obtain information on productivity of the various species from this source.

No specialized techniques were required. Punch cards (H-36) issued to each Forest District annually were completed by Conservation Officers whenever big game mortalities were encountered. Our present records of big game losses by causes other than legal hunting represent only a fraction of the actual non-season losses. Completeness of records varies with accessibility, human population and the interest of the public and the field staff in reporting non-season losses. We wonder what mortalities are reported consistently and what mortalities are dependent on chance discovery? If these variables are assumed contant, then the data may be of value in detecting trends in losses for individual districts and causes.

Causes other than legal kill have been listed as highway, illegal, drowning, predation, starvation, railroad, miscellaneous and unknown. Although predation and starvation are definitely two separate end results in this list of mortalities, the distinction in most cases between these is rather difficult. Miscellaneous causes include tangled in fences, crippling injuries as result of hunting, becoming mired, other hazards of the wilderness and those of civilization.

Deer kills on highways of Wisconsin and Michigan have increased steadily over the past years. In 1965, 9,360 deer were killed on the highways of Wisconsin and 3,232 deer losses occurred in the southern half of the Lower Peninsula of Michigan.

With increasing automobile numbers on better, high-speed roads in agricultural southern Ontario, deer - car collisions can be expected to climb at a rapid rate. Possible solutions to reduce this hazard are reduction of deer numbers through hunting, use of reflecting devices, use of repellants, improvement of deer - crossing signs, fencing right-of-way clearings, establishment of off-highway salt licks and maintenance and development of openings.

Although the following account is an extraordinary example of the hazard created by big game on highways, it points to the need for control of wildlife herds in more populous parts of southern Ontario.

On November 15, 1965, at approximately 9:30 p.m., Conservation Officer G.F. Love of the Lake Simcoe Forest District investigated an accident involving a deer.

Approximately one hour previous to the above accident, a car swerved to miss a deer at the same location, between the 3rd and 4th Concessions on the King Sideroad in King Township, and ran into the bank along the road, causing some $500.00 damage to the vehicle. The deer was apparently missed at this time. The driver of the vehicle was taken to Newmarket hospital by P.C. Russell of the King Township Police, suffering chest injuries, shock and possible broken ribs. As the officer left the hospital he was dispatched to another accident at the same location. On this occasion he found that a Chevrolet car had hit a deer resulting in $125.00 damage to the vehicle. As the driver attempted to pull his vehicle off the road, he was overtaken by a 1966 Chrysler which passed him and hit the deer which jumped in front of him. This vehicle suffered $220.00 damage. The driver of this car moved his vehicle to the shoulder of the road. At this time a third car, which was a Mini-Minor, overtook them and hit the deer which had struggled to its feet and jumped in front of it. This vehicle suffered approximately $350.00 damage to the front end. At this time a fourth car following the Mini-Minor crashed into the rear of the latter, totally demolishing the Mini-Minor at a value of approximately $1,000.00.

Three passengers of the Mini-Minor were taken to Newmarket Hospital. Damage to the fourth vehicle amounted to $250.00, bringing the total damages to $2,075.00 to five vehicles and four victims in the hospital. The deer, a 3-1/2 year old female, died at the scene.

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This report is a summary of information collected by field staff of the Department of Lands and Forests since 1958. The tables provided are self-explanatory.

Findings - General

Table 1 summarizes the big game losses in Ontario for the past eight years. This table does not provide information on the number of animals killed by Indians for food. Information on black bear losses by various causes is limited. In future, bears killed

by any means outside the open season should be recorded on the punch cards. Age class should be recorded as cubs (5-8 months old), yearlings (17 - 20 months), and older or adult bears.

Findings - Deer

Tables 2, 3, and 4 compare respectively, the number of annual deer mortalities for eight years from the eight causes; the distribution of annual deer mortalities for eight years in 19 Forest Districts, and the non-season deer mortalities by causes for each month during 1965.

Tables 5 and 6 provide sex and age ratios of the Provincial deer herd for the years 1959 to 1965.

Table 7 presents deer mortalities by causes other than legal kill as a percent of the total known kill for the years 1958 to 1965. The kill of deer by hunting was estimated through the use of total deer licence sales and the over-all hunting success for each year.

Tables 8 and 9 provide reproductive information for a 7-year period. Of the 338 does checked over the 7 year period, 218 (64.5%) were pregnant compared with 120 (3.5%) non-pregnant does. Of the 218 pregnant deer, 106 (48.6%) carried one embryo, 105 (48.2%) had two embryos and seven (3.2%) carried three embryos.

Table 1

Comparison of Non-Season Losses of Big Game in Ontario

(Deer, Moose, Black Bear*) for the Years 1958 - 1965

	Years							
Species	1958	'59	'60	'61	'62	'63	'64	'65
Deer	963	1075	822	1028	1071	906	1120	1299
Moose	141	159	133	114	114	124	208	231
Black Bear	-	20	-	-	24	95	86	66
TOTAL	1104	1254	955	1142	1209	1125	1414	1596

* Data for black bear incomplete.

Table 2: Comparison of Non-Season Losses of Deer by Causes 1958 - 1965

Cause	Number of Mortalities								Percent of Annual Total							
	1958	'59	'60	'61	'62	'63	'64	'65	1958	'59	'60	'61	'62	'63	'64	'65
Highway	592	444	439	575	539	504	620	766	61.5	41.3	53.4	55.9	50.3	55.6	55.4	59.0
Illegal	113	140	128	212	177	116	147	104	11.7	13.0	15.6	20.6	16.5	12.8	13.1	8.0
Drowning	-	42	18	9	16	13	14	16	-	3.9	2.2	0.9	1.5	1.4	1.3	1.2
Predation	109	226	128	130	221	157	226	196	11.3	21.0	15.0	12.6	20.6	17.3	20.2	15.1
Starvation	-	43	8	1	9	4	1	26	-	4.0	1.0	0.1	0.8	0.4	0.1	2.0
Railway	18	44	25	14	13	8	6	11	1.9	4.1	3.0	1.4	1.2	0.9	0.5	0.8
Miscellaneous	131	67	23	36	50	74	75	132	13.6	6.2	2.8	3.5	4.7	8.2	6.7	10.2
Unknown	-	69	58	51	46	30	31	48	-	6.4	7.1	5.0	4.3	3.3	2.8	3.7
T.O T A L	963	1075	822	1028	1071	906	1120	1299	100.0	99.9	100.1	100.0	99.9	99.9	100.1	100.0

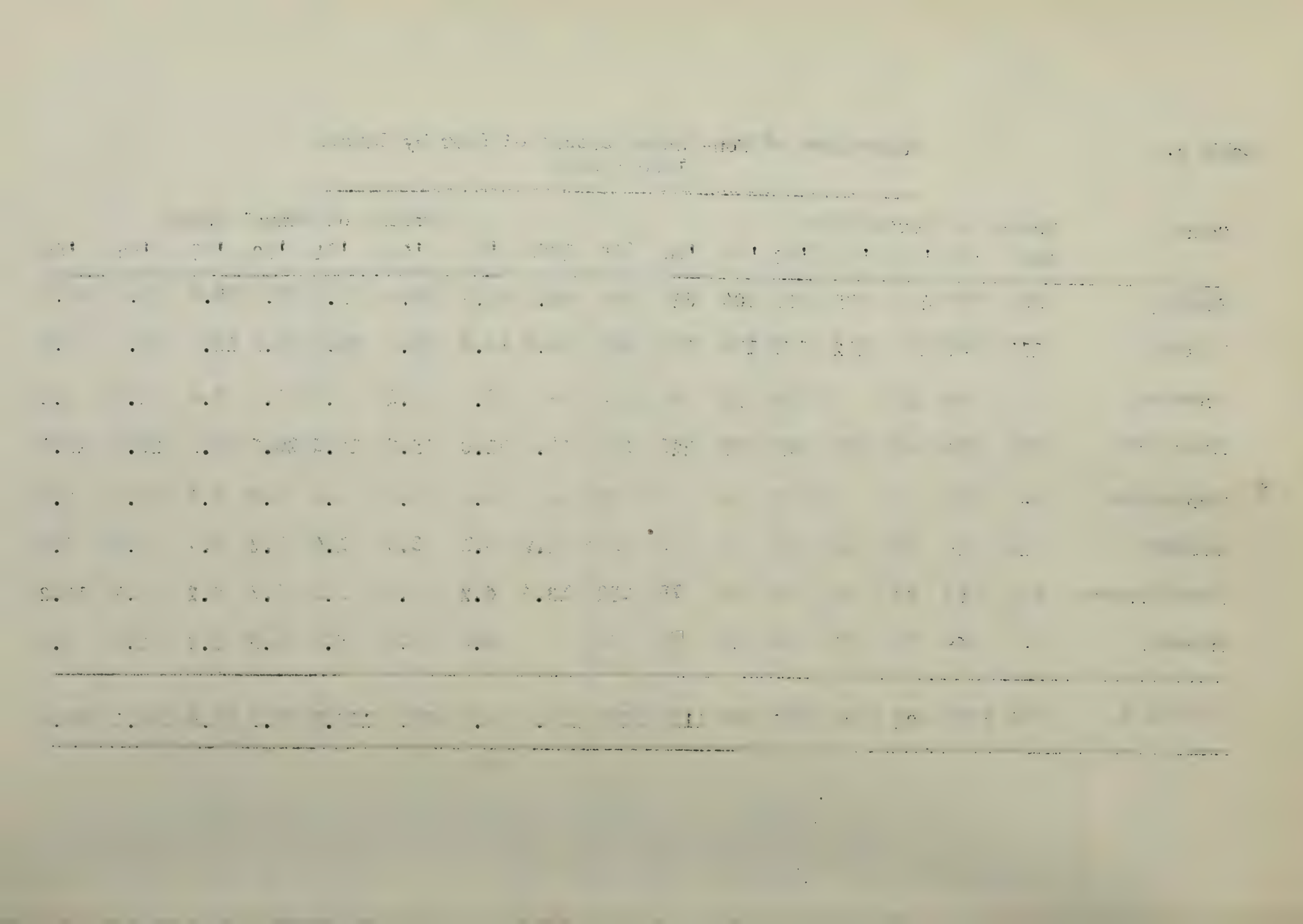

Table 3: Non-Season Deer Mortality Distribution by Forest District 1958 - 1965

Forest District	Number of Mortalities								Percent of Annual Total							
	1958	'59	'60	'61	'62	'63	'64	'65	1958	'59	'60	'61	'62	'63	'64	'65
Lake Erie	334	297	215	249	189	154	83	94	34.7	27.6	26.2	24.2	17.6	17.0	7.4	7.2
Lake Huron	135	54	104	99	84	82	108	206	14.0	5.0	12.7	9.6	7.8	9.1	9.6	15.9
Lake Simcoe	119	86	120	130	124	135	173	175	12.4	8.0	14.6	12.6	11.6	14.9	15.9	13.5
Lindsay	54	59	82	84	89	78	118	104	5.6	5.5	10.0	8.2	8.3	8.6	10.5	8.0
Tweed	17	48	23	19	29	24	27	63	1.8	4.5	2.8	1.8	2.7	2.6	2.4	4.8
Kemptville	59	108	66	51	77	47	60	56	6.1	10.0	8.0	5.0	7.2	5.2	5.4	4.3
Pembroke	39	113	-	120	110	73	129	78	4.0	10.5	-	11.7	10.3	8.1	11.5	6.0
Parry Sound	58	128	74	125	116	112	99	130	6.0	11.9	9.0	12.2	10.8	12.4	8.8	10.0
North Bay	16	79	59	-	35	6	13	33	1.7	7.3	7.2	-	3.3	0.7	1.2	2.5
Sudbury	6	-	-	-	-	14	91	69	0.6	-	-	-	-	1.5	8.1	5.3
S. Ste. Marie	6	37	2	13	66	51	78	79	0.6	3.4	0.2	1.3	6.2	5.6	7.0	6.1
Chapleau	-	-	-	-	2	-	-	-	-	-	-	-	0.2	-	-	-
Gogama	-	3	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-
Swastika	8	3	3	2	4	5	-	-	0.8	0.3	0.4	0.2	0.4	0.6	-	-
Geraldton	4	3	-	-	10	5	4	3	0.4	0.3	-	-	0.9	0.6	0.4	0.2
Port Arthur	25	37	33	60	43	25	51	39	2.6	3.4	4.0	5.8	4.0	2.8	4.6	3.0
Fort Frances	18	20	14	20	28	14	18	43	1.9	1.7	1.7	1.9	2.6	1.5	1.6	3.3
Kenora	35	-	27	56	50	81	63	78	3.6	-	3.3	5.4	4.7	8.9	5.6	6.0
Sioux Lookout	30	-	-	-	15	-	-	49	3.1	-	-	-	1.4	-	-	3.8
	963	1075	822	1028	1071	906	1120	1299	99.9	99.7	100.1	99.9	100.0	100.1	100.0	99.9

Table 4: Monthly Non-Season Deer Mortalities by Causes, 1965

Month	Highway	Illegal	Drowning	Predation	Starvation	Railroad	Misc.	Unkn.	Total	% of Ann. Tot.
January	31	9	-	38	-	-	9	7	94	7.2
February	18	4	-	44	3	-	10	1	80	6.2
March	25	7	2	62	10	-	17	7	130	10.0
April	71	2	2	25	6	2	13	3	124	9.5
May	116	2	5	4	1	2	8	11	149	11.5
June	96	2	1	-	-	1	12	2	114	8.8
July	55	2	-	-	-	1	3	2	63	4.8
August	37	-	-	-	-	-	6	-	43	3.3
September	44	2	-	-	-	-	5	3	54	4.2
October	109	24	1	-	-	5	8	-	147	11.3
November	104	21	2	2	-	-	8	2	139	10.7
December	50	27	2	18	-	-	10	8	115	8.9
Date Unknown	10	2	1	3	6	-	23	2	47	3.6
T O T A L	766	104	16	196	26	11	132	48	1299	100.0

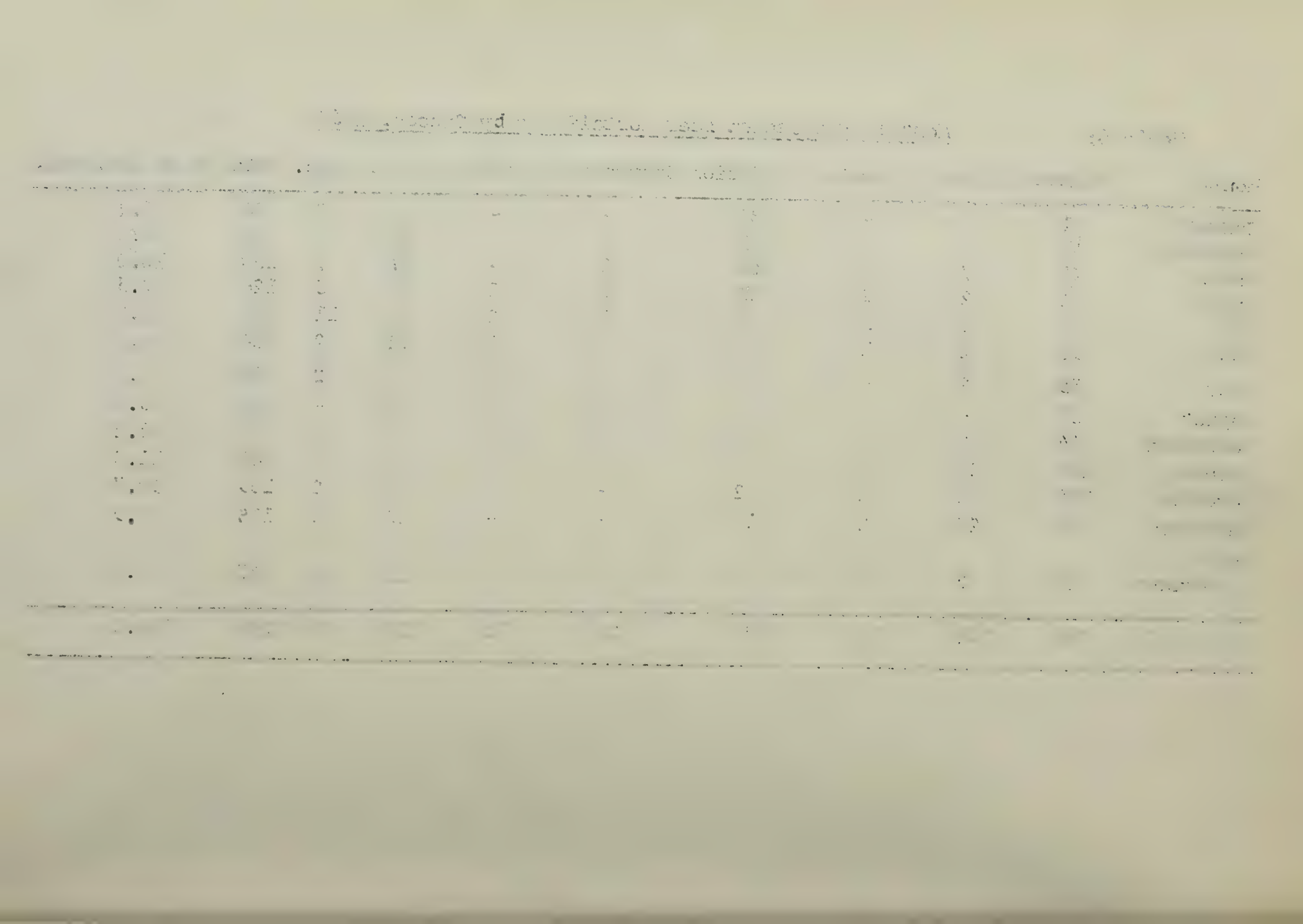

Table 5:

Reported Sex Ratios Among All-Age Non-Season Deer Mortalities 1959 - 1965

Year	Males	Females	M: 100 Females	% Males
1959	326	294	111	52.6
1960	284	239	119	54.3
1961	313	261	120	54.5
1962	288	292	99	49.7
1963	314	263	119	54.4
1964	326	303	108	51.8
1965	479	431	111	52.6
TOTAL	2330	2083	112	52.8

Table 6: Reported Age Ratios Among Non-Season Deer Mortalities 1959 - 1965

Year	1/2%	1-1/2%	2-1/2%	3-1/2%	4-1/2%	5-1/2%	6-1/2%	7-1/2+%	Total
1959	125(20.2)	183(29.5)	130(21.0)	103(16.6)	47(7.6)	26(4.2)	2(0.3)	4(0.6)	620(100.0)
1960	123(23.5)	163(31.2)	111(21.2)	75(14.3)	27(5.2)	16(3.1)	3(0.6)	5(1.0)	523(100.1)
1961	117(20.4)	180(31.4)	125(21.8)	84(14.6)	41(7.1)	13(2.3)	8(1.4)	6(1.0)	574(100.0)
1962	126(21.7)	146(25.2)	129(22.2)	96(16.6)	48(8.3)	16(2.8)	13(2.2)	6(1.0)	580(100.0)
1963	122(21.2)	150(26.0)	138(24.0)	85(14.8)	55(9.5)	13(2.3)	6(1.0)	7(1.2)	576(100.0)
1964	113(18.0)	215(34.2)	125(19.9)	80(12.7)	46(7.3)	24(3.8)	7(1.1)	14(2.2)	629(100.0)
1965	186(20.4)	267(29.3)	194(21.3)	140(15.4)	60(6.6)	23(2.5)	33(3.6)	7(0.8)	910(99.9)
TOTAL	917(20.8)	1304(29.6)	952(21.6)	663(15.0)	324(7.3)	131(3.0)	72(1.6)	49(1.1)	4412(100.0)

Table 7:

Comparison of Reported Non-Season Deer Mortalities and the Estimated Kill, 1956 vs. 1958 - 1964

Mortality	1965	Mean 1958 - 1964	Range 1958 - 1964
Reported Non-Season	1299	998	822 - 1120
Estimated Hunting Kill	36,800	28,950	24,800 - 32,800
Total Known	38,099	29,948	25,622 - 33,920
Non-Season Percent of Total	3.4	3.3	3.2 - 3.3

Table 8:

Reported Non-Season Doe Mortalities, Pregnant vs. Non-Pregnant Females and Number of Does with 0, 1, 2 or 3 Embryos: 1959-65

	Year							
	1959	'60	'61	'62	'63	'64	'65	Total
Non-Season Doe Mortalities	294	239	261	292	263	303	431	2083
No. of Does Checked for Embryos	38	26	38	50	55	104	27	338
% Does Checked	12.9	10.9	14.6	17.1	20.9	34.3	6.3	16.2
Does with 0 Embryo	16	3	9	18	15	57	2	120
Does with 1 Embryo	10	12	16	19	15	28	6	106
Does with 2 Embryos	10	11	11	12	24	19	18	105
Does with 3 Embryos	2	0	2	1	1	0	1	7

Table 9:

Reported Productivity of Deer: Number of Does of Each Age Class with 0, 1, 2, or 3 Embryos. 1959 - 1965.

	No. of Embryos			
Age Class	0	1	2	3
1/2	13	2	-	-
1-1/2	35	14	9	-
2-1/2	22	40	29	3
3-1/2	25	26	35	2
4-1/2	11	16	18	1
5-1/2	4	1	8	-
6-1/2	2	2	4	1
7-1/2	1	2	-	-
8-1/2	7	3	2	-
TOTAL DOES	120	106	105	7

Findings - Moose

Tables 10, 11 and 12 compare respectively, non-season moose losses by causes for eight years; distribution of non-season moose kill by Forest District 1964 and 1965; and monthly, non-season moose mortalities by causes for 1965. Sex and age ratios of the non-season moose kill are represented in Tables 13 and 14. Table 15 compares reported non-season moose kill with the Provincial calculated kill. Tables 16 and 17 provide reproductive information for an 8 year period.

Of the 77 cows checked over the 8 year period, 41 (53.2%) were pregnant compared with 36 (46.8%) non-pregnant cows. Of the 41 pregnant moose, 21 (51.2%) carried one embryo and 20 (48.8%) had two embryos. No cows with three embryos were encountered.

Table 10: Comparison of Non-season Losses of Moose by Causes, 1958 - 1965

Causes	Number of Mortalities								Percent of Annual Total							
	1958	'59	'60	'61	'62	'63	'64	'65	1958	'59	'60	'61	'62	'63	'64	'65
Highway	44	47	33	37	55	55	90	119	31.2	29.6	24.8	32.5	48.2	44.4	56.6	51.5
Illegal	18	18	16	15	12	13	21	18	12.8	11.3	12.0	13.2	10.5	10.5	13.2	7.8
Drowning	17	4	5	10	8	6	-	11	12.1	2.5	3.8	8.8	7.0	4.8	-	4.8
Predation	-	13	7	-	5	3	3	3	-	8.2	5.3	-	4.4	2.4	1.9	1.3
Starvation	-	1	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-
Railroad	44	60	60	34	22	33	45	46	31.2	37.7	45.1	29.8	19.3	26.6	28.3	19.9
Miscellaneous	8	9	4	11	8	8	-	21	5.7	5.7	3.0	9.6	7.0	6.5	-	9.1
Unknown	10	7	8	7	4	6	-	13	7.1	4.4	6.0	6.1	3.5	4.8	-	5.6
TOTAL	141	159	133	114	114	124	159	231	100.1	100.0	100.0	100.0	99.9	100.0	100.0	100.0

Table 11:

Non-Season Moose Mortality Distribution by Forest District, 1964 and 1965.

Forest District	Number of Mortalities		Percent of Annual Total	
	1964	1965	1964	1965
Sioux Lookout	--	14	--	6.1
Kenora	10	5	4.8	2.2
Fort Frances	2	12	1.0	5.2
Port Arthur	16	15	7.7	6.5
Geraldton	17	28	8.2	12.1
White River	22	27	10.6	11.7
Chapleau	33	13	15.9	5.6
Gogama	14	19	6.7	8.2
Kapuskasing	6	13	2.9	5.6
Cochrane	16	13	7.7	5.6
Swastika	11	15	5.3	6.5
Sault Ste. Marie	14	24	6.7	10.4
Sudbury	18	5	8.7	2.2
North Bay	6	11	2.9	4.8
Parry Sound	9	11	4.3	4.8
Pembroke	11	4	5.3	1.7
Tweed	--	1	--	0.4
Lindsay	3	1	1.4	0.4
T O T A L	208	231	100.1	100.0

Table 12: Monthly Non-Season Moose Mortalities by Causes, 1965

Month	Causes								Percent of Annual Total.
	Highway	Illegal	Drowning	Predation	Railroad	Misc.	Unknown	Total	
January	4	-	2	1	4	1	2	14	6.1
February	1	2	-	1	2	3	-	9	3.9
March	-	-	-	1	-	2	-	3	1.3
April	2	1	1	-	3	-	-	7	3.0
May	19	1	8	-	9	2	1	40	17.3
June	39	4	-	-	9	3	3	58	25.1
July	24	2	-	-	7	1	2	36	15.6
August	8	-	-	-	-	-	-	8	3.5
September	3	2	-	-	4	-	1	10	4.3
October	1	3	-	-	3	2	1	10	4.3
November	2	3	-	-	2	-	-	7	3.0
December	3	-	-	-	-	-	-	3	1.3
Date Unknown	13	-	-	-	3	7	3	26	11.3
T O T A L	119	18	11	3	46	21	13	231	100.0

Table 13: Reported Sex Ratio Among All-Age Non-Season Moose Mortalities 1958 - 1965.

Year	Males	Females	M:100 F	Percent Males.
1958	52	45	116	53.6
1959	47	50	94	48.5
1960	45	43	105	51.1
1961	35	46	76	43.2
1962	37	39	95	48.7
1963	39	46	85	45.9
1964	54	83	65	39.4
1965	57	82	70	41.0
TOTAL	366	434	84	45.8

Table 14: Reported Age Ratios of Non-Season Moose Mortalities 1958 - 1965

Year	Year Class							
	Calf (%)	I (%)	II (%)	III (%)	IV (%)	V (%)	VI-IX (%)	TOTAL
1958	14(14.4)	20(20.6)	17(17.5)	19(19.6)	9(9.3)	9(9.3)	9(9.3)	97(100.0)
1959	20(20.6)	26(26.8)	12(12.4)	14(14.4)	8(8.2)	5(5.2)	12(12.4)	97(100.0)
1960	11(12.5)	19(21.6)	18(20.5)	13(14.8)	12(13.6)	8(9.1)	7(8.0)	88(100.0)
1961	12(14.8)	29(35.8)	18(22.2)	10(12.3)	7(8.6)	3(3.7)	2(2.5)	81(99.9)
1962	10(13.2)	16(21.1)	13(17.1)	18(23.7)	9(11.8)	8(10.5)	2(2.6)	76(100.0)
1963	11(12.9)	18(21.2)	20(23.5)	17(20.0)	7(8.2)	8(9.4)	4(4.7)	85(99.9)
1964	21(15.3)	28(20.4)	29(21.2)	19(13.9)	18(13.1)	18(13.1)	4(2.9)	137(99.9)
1965	21(15.1)	31(22.3)	30(21.6)	27(19.4)	13(9.4)	11(7.9)	6(4.3)	139(100.0)
TOTAL	120(15.0)	187(23.4)	157(19.6)	137(17.1)	83(10.4)	70(8.8)	46(5.8)	800(100.1)

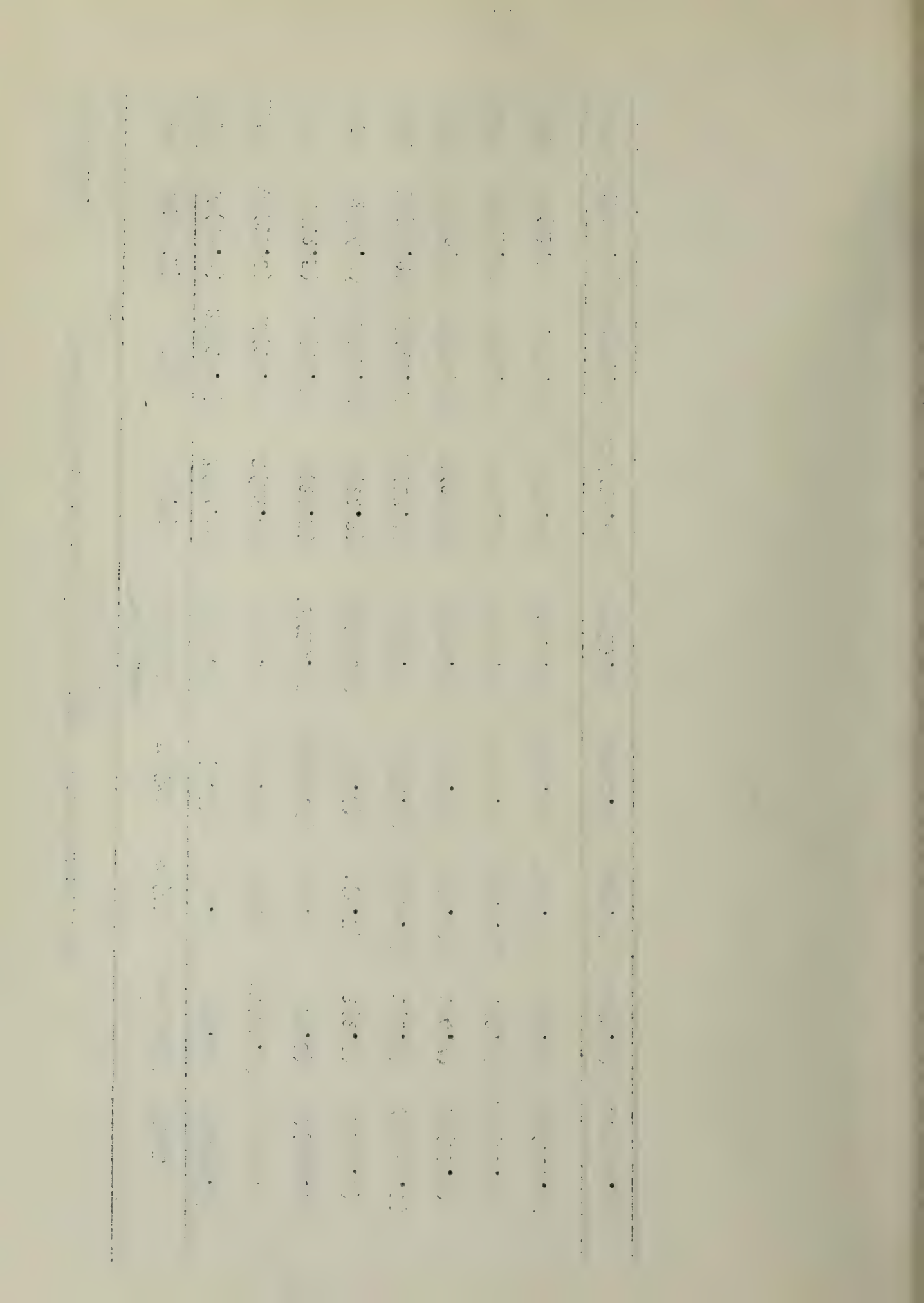

Table 15:

Comparison of Reported Non-Season Moose Mortalities and the Calculated Kill, 1965 vs. 1958 - 1964.

Mortality	1956	Mean 1958 - 1964	Range 1958 - 1964
Reported Non-Season	231	142	114 - 208
Calculated Hunting Kill	14,977	11,384	7,386 - 13,574
Total Known	15,208	11,526	7,500 - 13,782
Non-Season Percent of Total	1.52	1.23	1.52

Table 16:

Reported Non-Season Cow Moose Mortalities, Pregnant vs. Non-Pregnant Females and Number of Cows with 0, 1, 2, or 3 Embryos: 1958 - 1965.

	Year								
	1958	'59	'60	'61	'62	'63	'64	'65	Total
Non-season Cow Mortalities	45	50	43	46	39	46	83	82	434
No. Of Cows Checked for Embryos	12	6	9	3	4	3	30	10	77
% of Cows Checked	26.7	12.0	20.9	6.5	10.3	6.5	36.1	12.2	17.7
Cows 0 Embryos	6	3	6	2	2	0	17	0	36
Cows 1 Embryo	2	1	1	0	0	2	7	8	21
Cows 2 Embryos	4	2	2	1	2	1	6	2	20
Cows 3 Embryos	0	0	0	0	0	0	0	0	0

Table 17:

Reported Productivity of Moose: Number of Cows of Each Age Class with 0, 1, 2, or 3 Embryos. 1958 - 1965.

	Number of Embryos		
Year Class	0	1	2
Calf	6	-	-
1	3	-	-
11	8	5	5
111	5	5	5
IV	6	4	3
V	3	2	5
V1	1	2	-
V11-1X	4	3	2
Total Cows	36	21	20

Findings - Black Bear and Caribou

Table 18 shows the number of black bear killed on the highways or destroyed as nuisance bear during 1965. Certainly this is not a complete record for Ontario because only six Forest Districts are represented. In future, black bear killed by means other than legal hunting should be recorded on punch cards.

In 1965, two caribou were killed by trains. A 2-1/2 year old female was killed in the Geraldton Forest District and 1-1/2 year old female was hit by a train in the White River Forest District.

Table 18:

Non-Season Black Bear Losses by Causes and Forest Districts for 1965.

Forest District	Cause		Total
	Highway	Nuisance	
Kenora	3	12	15
Fort Frances	-	2	2
White River	2	1	3
Sault Ste. Marie	1	3	4
Pembroke	-	40	40
Lindsay	1	1	2
T O T A L	7	59	66

ALBINO BROOK TROUT EXPERIMENTAL MANAGEMENT PROGRAMME STUDY

by
D. G. Waldriff and R. R. Hamilton

Abstract

The programme was initiated in 1963 as an experiment to determine the development potential of the phenomenon that some "white eggs" usually picked as "bad eggs" eventually resulted in the production of a creamy gold colour Brook Trout specimen.

It is the opinion of the authors that objectives of the experiment have been fulfilled, and the disappointing results of survival in the wild and the lack of any widespread angler enthusiasm dictates that any intention to continue the artificial propogation and planting of this fish should be discouraged.

Introduction

The experiment, as outlined by V. B. Collins, Biologist, Swastika Forest District at the time, is attached as Appendix I.

Investigations to determine survival of plantings were conducted by creel census and netting projects.

Procedure

Leta and Lallan Lakes received complements of both the Albino and Brook Trout specimens and were planted as follows:

1963:	Leta Lake	2,183 Albino - 2,183 Brook Trout
1964:	Lallan Lake	2,200 Albino - 2,200 Brook Trout

Arrangements were made to collect creel census data from both lakes by soliciting co-operation of a nearby tourist outfitter and the Esker Lakes Park Attendants for the two lakes respectively. Intensive gill netting projects were carried out in both lakes in July, 1966.

Gaf and Kollicut Lakes were planted with Albino Brook Trout as planned but at reduced rates as sufficient numbers were not available.

	1963	1964	1965
Gaf Lake	3,120		
Kollicut Lake		1,936	4,380

Arrangements to determine fishing pressures and creel data from the two lakes were made with the Esker Lakes Park Attendants and the Englehart Conservation Officer respectively. Intensive gill netting projects were conducted in June and July, 1966. In respect to Kollicut Lake, follow-up interviews with any known anglers who fished this water were made.

Results

Neither the scheduled or voluntary creel censusing in Gaf and Lallan Lakes in Esker Lakes Park revealed the capture by angling of one Albino specimen. According to information from Mr. Frank Bowen, Tourist Outfitter at Lost Lake, who has his guests fish Leta Lake continuously, and voluntary creel census, not one Albino was taken from the Leta Lake waters. During the period in question, normal Brook Trout were taken by angling. Kollicut Lake has produced a recorded 402 Albino Brook Trout ranging in size up to fifteen inches.

The gill netting results support the creel information. In Lallan Lake, 14 normal Brook Trout ranging in size up to nineteen inches and weighing four pounds were taken in forty-four hours of netting. In Leta Lake, twenty-six normal Brook Trout and fourteen Common Suckers were taken during thirty-six hours of netting. The largest fish taken in Leta Lake in 1966 weighed two pounds and was taken by angling. Gaf Lake was subjected to a total of one hundred and seventy-nine hours of gill netting which failed to produce a single fish.

Interviews with the Kollicut Lake anglers revealed that ice fishing was the most productive, and angling success since June has been negligible. Most anglers found that blanketing the hole and watching the fish taking the hook proved to be the most successful method. A favourite bait became a small piece of cheese, which had been dipped in honey, on a small fly hook. It was generally expressed that the Albino did not provide the fishing or eating quality of the Brook Trout. The majority expressed the viewpoint that hooking one was a novel experience but unlikely to become a preference. The edibility qualities varied from poor to very sweet and on more than one occasion, it was stated that the thought of eating the Albino specimen caused a nauseating feeling.

Discussion

The fact that only one lake provided a fishery and survival could not be determined in the other three (although normal Brook Trout survived in the two lakes that received plantings of the two strains of Brook Trout), it must be concluded that the survival potential of the Albino Brook Trout in a wild environment will be minimal. The lack of enthusiasm expressed by the anglers once the curiousity and novelty experience had been fulfilled suggests that the fish would not become too popular.

Recommendations

- That the artificial culture of Albino Brook Trout be discontinued.

- That all Albino Brook Trout stock at Hill Lake Hatchery be planted in Kollicut Lake.

- That the Hill Lake Hatchery Manager prepare a Fish Culture and Rearing Report of the Albino Brook Trout to supplement the information gained from this experiment.

APPENDIX I

ALBINO BROOK TROUT MANAGEMENT PROGRAMME

SWASTIKA DISTRICT

V. B. Collins

Introduction

Albino Brook Trout appear occasionally among the fish reared at Hill's Lake Hatchery. Usually they are eliminated when they are picked as bad "white" eggs. However, some survive and have been reared to adults. They are popular with hatchery visitors.

Albinos are attractive, appearing a creamy gold colour in the water. When in the hand, they appear more yellowish with red spots.

This area is economically depressed and is striving for an increased tourist industry. Any natural resource which can be managed to promote the industry is important. It has occured to us that Albino Brook Trout may provide a sport fishery with considerable potential as an attraction to anglers.

We have been unable to find any references in the literature to their use as a sports fish.

Objectives

Our primary objective is to establish a limited Albino fishery to assess its value. Pertinent to management, we specifically wish to ascertain the following facts about Albinos:

(a) Survival in lakes in competition with normal hatchery brook trout.

(b) Survival in virgin or reclaimed waters.

(c) Survival and return to anglers of two-year old Albinos on a put-and-take basis in competition with normal stock.

(d) Angling qualities, catchability and general desirability as determined from creel censuses and angler interview.

Plan

1963:

(a) Stock Leta Lake (Lawson Twp.) with 2,250 yearling Albino Trout. Plant the same number of fin-clipped yearling normal Brook Trout. Collect complete creel census data during the year.

Leta Lake (41 acres) has a population of Brook Trout maintained by annual plantings of yearling hatchery stock.

(b) Plant Gaf Lake (Clifford Twp.) with 4,250 yearling Albinos. Collect complete creel census data during the year.

Gaf Lake (42.5 acres) was reclaimed in 1960 and is detoxified.

1964:

(a) Continue creel census on Leta Lake. Test net in August using at least 6 standard sets. Do not plant trout.

Plant Lallan Lake (Clifford Twp.) with 2,200 yearling Albinos and 2,200 yearling normal stock. Collect complete creel census data through the year. Lallan Lake (37.5 acres) has a population of Brook Trout maintained by annual plantings of yearling hatchery stock. This is a replica of the Leta Lake experiment.

(b) Continue creel census on Gaf Lake. Test net in August using at least 6 standard sets. Plant in September with 2,250 yearling Albinos.

Stock Kollicut Lake (Beauchamp Twp.) with 2,550 yearling Albinos. Collect complete creel census data through the year. Kollicut Lake (22.0 acres) was reclaimed in 1962 and should be available for the experiment. This is a replica of the Gaf Lake experiment.

1965:

(a) Continue creel census on Leta and Lallan Lakes. Test net Lallan in August using at least 6 standard sets. No further plantings are to be made in either lake.

(b) Continue creel census on Gaf and Kollicut Lakes. Test net Kollicut Lake in August using at least 6 standard sets. Plant this lake in September with 1,250 yearling Albinos.

(c) Plant 4,400 two-year old Brook Trout (2,200 Albinos; 2,200 normal, fin-clipped) in Silverclaim Lake (Mickle Twp.). Collect complete creel census data for the year. Test net in August using at least 6 standard sets. Silverclaim (41.2 acres) has a population of Brook Trout maintained on a put-and-take basis by annual plantings of fish two years old or older.

1966:

Continue creel censuses on Kollicut, Lallan and Silverclaim Lakes. No further plantings of Albino stock are to be made and the lakes are to return to their normal management pending the final report of this programme.

Measurements of the survival rate of Albinos in competition with normal stock should be reflected in the ratio of Albinos to normals (of the same age classes) in the creel and net catches. It is possible that Albinos may differ from normals in their catchability by rod and net. However, the use of test nets should provide useful indices of the relative abundance of Albinos in the four lakes.

(d) The angling qualities of Albinos can be determined by angler interview in the course of creel census throughout the study. We wish to know whether it provides good sport; whether its conspicuousness is an advantage to the angler and generally what degree of acceptance they receive.

Culture of Albino Brook Trout

Albinos are reared in the same way as normal Brook Trout. They can be accommodated with normals, and can, of course, be easily separated from them when needed. Albinos have been spawned at the hatchery on an experimental basis. The 1961 collection produced Albinos in a ratio of 1 to 3 normal coloured trout. Spawn collections were also made in 1962, and it is interesting to note that Albinos produce approximately twice as many eggs as normal stock of the same size. The results of these experiments and plans for others will be reported elsewhere.

Albino Trout requirements for field studies are summarized as follows:

Year	No. of Yearlings	No. of 2 Yr. Olds
1963	6,500	0
1964	7,000	0
1965	1,250	2,200

Public Relations

It is necessary to inform the public through the press, sportsmen's groups and other means that the status of the Albino is experimental in nature. If and when it is established that the Albino is a desirable complement to our Brook Trout fishery, consideration will be given to its production.